List of U.S. Army Research Institute Research and Technical Publications

October 1, 2001 to September 30, 2002
With Author and Subject Index

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Foreword

The means of dissemination of the results of ARI's research and development/studies and analysis program vary widely depending on the type of work, the subject matter, and the sponsor/proponent. Typically, major findings with immediate policy and procedural implications are briefed to sponsors and proponents in order to enable timely implementation. This is followed up with complete documentation in the form of research and technical publications such as the ones listed here. In many cases, these documents represent the actual item handed off to the sponsor/proponent; this is particularly true of the Research Product category. In other cases, results are published in order to provide a complete record of the work done, and for future reference by researchers doing work in the same or similar areas.

This annotated list for FY02 provides an idea of both the depth and scope of the ARI research effort, and is a valuable resource for anyone interested in military psychology from either a scientific or operational perspective.

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Introduction

The primary responsibility of the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) is to maximize soldier effectiveness. ARI accomplishes its mission through research and development in the acquisition, training, utilization, and retention of Army personnel. ARI research and products affect every Army mission with a human performance component.

As convenient references for qualified agencies and individuals and sponsors, ARI publishes lists of its technical and research publications. This issue of the publication list describes reports published during the period October 1, 2001, to September 30, 2002. It contains the abstract of each publication and the bibliographic information needed to identify a publication. The abstracts have been written, as far as possible, to describe the principal research findings in non-technical terms; however, technical language is used to communicate efficiently the details of research analysis. Author and subject indexing provide access to individual reports and topics.

ARI Publications

ARI publications are divided into separate, consecutively numbered categories appropriate to their intended audience and function. During fiscal year 2002, the following types of research and technical reports were issued by ARI:

Research Note (RN). An interim or final report typically of limited interest outside of ARI. It is filed with the Defense Technical Information Center (DTIC) but is not printed. Research Notes usually fall into one of the following categories:

- An in-house report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the Department of Defense (DoD) archive of technical documentation.

- An interim contract report that is of limited interest outside of ARI but is considered worth submitting to DTIC to be part of the DoD archive of technical documentation.

- A final contract report that is of limited interest outside of ARI but must be submitted to DTIC in accordance with Department of the Army regulations to close a contract.

- Material related to a Research Report or Technical Report (detailed tables, graphs, charts, sample forms, and sample training and testing materials) published as a Research Note to economize on printing and distribution.

Research Product (RP). A user-oriented report intended to aid Army personnel. Examples are handbooks, manuals, and guidebooks.

Research Report (RR). A report of completed research intended primarily for dissemination to military managers. Research Reports may deal with policy-related issues but typically do not include specific policy recommendations.

Special Report (S). A published report on a topic of special interest or in-house research intended primarily for dissemination to a select audience.

Study Report (SR). A published report briefly documenting studies and analyses.

Study Note (SN). A Study Note may contain or consist of technical text, computer code, diskettes or tapes with software, databases, codebooks or other documentation, raw data, data collection instruments, figures, tables, or any other products that do not concisely convey the import of a project but which must be archived for technical completeness.

Technical Report (TR). A report of completed research intended primarily for dissemination to researchers.

Research Reports and Technical Reports published by the U.S. Army Research Institute for the Behavioral and Social Sciences are intended for sponsors of research and development (R&D) tasks and for other research and military agencies. Any findings ready for implementation at the time of publication are presented in the last part of the Executive Summary. Upon completion of a major phase of the task, formal recommendations for official action normally are conveyed to appropriate military agencies by briefing or memorandum.

ARI Distribution

Initial distribution of these publications was made directly by ARI. Research Reports, Technical Reports, Study Reports, and Research Products were distributed primarily to operational and research facilities and their sponsors in DoD, to other interested Government agencies, and to DTIC; copies of some reports were also sent to the Library of Congress for distribution to libraries participating in the Documents Expediting Project. Research Notes and Study Notes were deposited with DTIC but were not published.

These publications are NOT available from ARI. DoD agencies and contractors can purchase paper copies or microfiche from:

Defense Logistics Agency
Defense Technical Information Center
8725 John J. Kingman Road, Suite 0944
Ft. Belvoir, VA 22060-6218
(703) 767-9030 or DSN 284-9030

Other Government agencies and the general public can obtain unclassified reports from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
(703) 487-4650

NOTE: When requesting copies of these reports, use the DTIC accession number (AD - - - - - - -) appearing in parentheses following the date of publication of each citation.

TR 1121
Question Generation as a Learning Multiplier in Distributed Learning Environments. Graesser, A.C., and Wisher, R.A. October 2001. (AD A399456)

This report provides a rationale for question generation as a workable learning multiplier in distributed learning environments. The rationale was derived from a thorough review of recent research on questioning from multiple perspectives: psychology, cognitive science, computational linguistics, and information systems design. Based on this review, nine practices were identified for immediate use in both the conventional classroom and distributed learning settings. If employed properly, question generation strategies in distributed learning can increase a soldier's depth of understanding about the workings of a complex system. The strategy is particularly useful for asynchronous distance learning, where the instructor is not necessarily available to answer questions promptly.

TR 1122
Evaluating an Approach to MOUT Decision Skills Training. Pliske, R.M., Militello, L.G., Phillips, J., and Battaglia, D.A. October 2001, (AD A399392)

An experimental training program was developed to improve the battlefield decision skills of platoon leaders during Military Operations in Urban Terrain (MOUT). The program was implemented in the form of a multimedia, train-the-trainer CD-ROM titled "IMproving Performance through Applied Cognitive Training" (IMPACT). This report describes an evaluation of the usability of IMPACT, including an exploration of methodological issues associated with evaluating the effectiveness of training programs to improve decision-making skills. The evaluation was conducted at the U.S. Military Academy with cadets and U.S. Army captains participating as students and instructors, respectively. Participants were randomly assigned to either IMPACT or traditional after-action review (AAR) conditions. Instructors conducted two training sessions with cadets using either IMPACT or traditional AAR methods. Cadets then participated in a final session where they were tested on their MOUT decision-making skill and knowledge. Although we found few statistically significant differences between cadets in the two conditions, instructors reported IMPACT to be a valuable and highly usable training tool. Furthermore, we were able to develop an objective test to measure decision quality, as well as a process that resulted in reliable ratings of decision quality from subject matter experts.

TR 1123
Analysis of Infantry Situation Awareness Training Requirements. Strater, L.D., Jones, D. and Endsley, M.R. November 2001. (AD A399391)

The application of emerging digital technologies promises to revolutionize information acquisition and distribution on the battlefield of the near future. With more rapid information flow, even minimally experienced officers will be pushed to achieve faster decision-action cycles, reducing the time to make and implement decisions. With this advent, officers will increasingly require robust abilities to rapidly develop and maintain high levels of situation awareness (SA) in the harsh, dynamic, and confusing environment of Infantry combat. To date, no training programs have been developed specifically for the purpose of enhancing SA in Infantry forces. This study focused on

identifying areas of low and high SA, especially those areas where training can be employed to reduce deficits in SA among less experienced officers. A literature review was conducted to explore research into SA, with an emphasis on the Infantry domain. In addition, data from a prior study were examined to explore the relationships between SA and decision-making. Finally, trainers were surveyed to solicit their input on specific strengths and weaknesses in the SA of new platoon leaders. Results of the investigation include recommendations for training programs to improve SA in Infantry forces.

TR 1124
Intelligent Tutoring System for Teaching Battlefield Command Reasoning Skills -- Phase I Final Report
Domeshek, E.A. March 2002.
(AD A400494)

Report developed under a Small Business Innovation Research Program 2000.2 contract for topic OSD00-CR02. The research reported here aimed at the design of a Socratic Intelligent Tutoring System (ITS) for high-level battlefield command reasoning skills. The ultimate goal of this research is to develop new ITS techniques and technology for teaching skills that cannot be taught as simple methods and procedures to be followed. Achieving expert levels of proficiency in high-level command reasoning skills—whether for battlefield commanders or for executives in industry—requires extensive practice, coaching, and feedback. Learners must be given a chance to drill on detailed and situation-specific knowledge, as well as high-level thinking habits and skills applicable across diverse situations. We studied exemplary command reasoning mentoring by observing tutoring sessions centered on Tactical Decision Games

(TDGs). We analyzed those sessions to produce a first draft general model of tutoring actions. We also built a limited proof-of-concept prototype that exhibited many of the key behaviors identified. Taken together, the conduct and products of our Phase I work, along with our proven strong team of collaborators, position us well to carry through on the ambitious work plan outlined here for Phase II.

TR 1125
Automated Tutoring Environment for Command (ATEC): Using an Intelligent Tutor to Model Expert Mentor Interactions. Ryder, J.M., DePaul, J.L., Zachary, W.W., and Iordanov, V. March 2002. (AD A400648)

This report developed under a Small Business Innovation Research Program 2000.2 contract for topic OSD00-CR02. The report discusses the feasibility of developing an intelligent tutoring system (ITS) for the interactive training of thinking skills, such as battlefield command reasoning. This ITS will operate within the deliberate practice framework. An "Automated Tutoring Environment for Command" (ATEC) system was designed and a limited prototype was developed to automate the Think Like a Commander (TLAC) materials. The ATEC system is comprised of : (a) a dialog management capability from the AutoTutor system, (b) an instructional agent that replicates the knowledge and role of the human TLAC tutor, and (c) a web-based personalized interface that manages the interaction between instructional agent and trainee. The Phase I research effort reported here has defined the architecture for ATEC. This effort has also demonstrated a proof-of-concept prototype, and has provided a detailed design for a full-scale Phase II system development by September 2003.

TR 1126
Analog Scales as Temperament Measures in the Baseline Officer Longitudinal Data Set (BOLDS). Milan, L. M. March 2002. (AD A400570)

The Baseline Officer Longitudinal Data Set (BOLDS) was developed jointly by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and the U.S. Military Academy (USMA) to enable researchers to study the development of leader performance over time. Currently, BOLDS consists of data accumulated on USMA cadets from the Class of 1998. Because no personality inventories were administered to cadets, analog scales were developed to represent the scales of the *Assessment of Background and Life Experiences* (ABLE) and the *NEO Personality Inventory* (NEO-PI). This report examines these empirically derived analog scales to ensure they measure within BOLDS what they were intended to measure. Two replication exercises were performed: (1) rerunning analyses Evans (1997) ran when creating the analog scales and (2) comparing results produced using the analog scales with those that emerged from *actual* ABLE scales. Results indicate the analogs perform in a manner consistent with previous analyses, suggesting they suffice as veridical temperament measures and may be used as such in future BOLDS analyses.

TR 1127

Measures Collected on the USMA Class of 1998 as Part of the Baseline Officer Longitudinal Data Set (BOLDS). Milan, L.M., Bourne, D.R., Zazanis, M.M., and Bartone, P.T. March 2002. (AD A400567)

The Baseline Officer Longitudinal Data Set (BOLDS) was developed jointly by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) and the US Military Academy (USMA) to enable researchers to study the development of leader performance over time. Currently, BOLDS consists of data accumulated on USMA cadets from the Class of 1998. The measures in the database represent ten broad dimensions relevant to leader development: cognitive aptitude, complex problem-solving skills, tacit knowledge of military leadership, temperament, motivation, leadership style, leadership performance, physical fitness, cognitive-emotional identity development, and developmental experiences. This report identifies all of the measures included in BOLDS and describes their psychometric properties. Such documentation is essential to facilitate utilization of the database and to inform future data collections, which are scheduled to track this officer cohort throughout their military careers and to expand BOLDS to officers from other commissioning sources.

TR 1128
Development of Predictor and Criterion Measures for the NCO21 Research Program. Knapp, D.J., Burnfield, J.L., Sager, C.E., Waugh, G.W., Campbell, J.P., Reeve, C.L. Campbell, R.C., White, L.A., and Heffner, T.S. June 2002. (AD A404458)

The NCO21 research program was undertaken to help the U.S. Army plan for the impact of future demands on the noncommissioned officer (NCO) corps. The performance requirements and associated knowledge, skills, and aptitudes (KSAs) expected of future successful NCOs were used as a basis for developing tools that could be incorporated into an NCO performance management system geared to 21st-century job demands. This report documents the design and development of predictor and criterion measures that will be used in a criterion-related validation data collection.

The predictor measures include the Armed Services Vocational Aptitude Battery (ASVAB), Assessment of Individual Motivation (AIM), and Biographical Information Questionnaire (BIQ), which are operational tests already used in the Army for other purposes. A written Situational Judgment Test (SJT), the Experience and Activities Record (ExAct), Personnel File Form (PFF21), and a semi-structured interview were developed for this project.

Two types of rating scale instruments were developed for gathering criterion data. The Observed Performance Rating Scales ask supervisors to rate soldiers on how well they perform in their current jobs. The Expected Future Performance Rating Scales ask supervisors to predict how their soldiers would perform in specific sets of conditions expected to be characteristic of future Army requirements.

TR 1129
Virtual Environments for Dismounted Soldier Simulation, Training, and Mission Rehearsal: Results of the FY 2001 Culminating Event. Knerr, B.W., Lampton, D.R., Crowell, H.P., III, Thomas, M. Comer, B.D., Grosse, J.R., Centric, J., Garfield, K.A, Martin, G.E., and Washburn, D.A. June 2002. (AD A 403147)

This report describes the activities and results of the third year culminating event (CE) of the "Virtual Environments for Dismounted Soldier Simulation, Training and Mission Rehearsal" Science and Technology Objective (STO). This STO is being conducted jointly by the U.S. Army Research Institute, the U.S. Army Simulation, Training, and Instrumentation Command (STRICOM), and the U.S. Army Research Laboratory. This four-year effort (FY99-FY02) is focused on overcoming critical technological challenges that currently prevent high fidelity dismounted soldier simulation. The objectives of the CE

were to integrate and evaluate the technologies developed during the year. The key technologies included: a Dismounted Infantry Virtual After Action Review (AAR) System; new behaviors and improved operator control for Dismounted Infantry Semi-Automated Forces (DISAF); soldier control of DISAF through Voice Recognition and Synthesis; enhancements to the soldier simulator, the Soldier Visualization Station (SVS); an improved locomotion device, the Omni-Directional Treadmill (ODT); a dynamic terrain server; and a Mission Planning and Training Tool (MPTT). The CE provided a realistic and challenging test of the systems and capabilities under development. The results identified both accomplishments and areas in which improvements and corrections are required.

TR 1130
Assessing Decision-Making Skills in Virtual Environments. Gately, M.T., Watts, S.M., and Pleban, R.J. June 2002. (AD A405079)

Members of small dismounted units will face growing responsibilities and increasing challenges in combined arms combat and contingency operations on the battlefield of the future. Many of these missions will take place in urban settings. Training for military operations on urbanized terrain is limited by time, cost, and safety factors. Virtual environment technologies have the potential to provide the Army with a training capability to meet these new demands. An automated training and after action review support tool (Virtual Soldier Skills Assessor – ViSSA) is described. The ViSSA system will allow trainers to effectively assess soldier and small unit leader tactical and decision-making skills in virtual urban environments. The system tracks mission-related factors linked to soldier decisions,

movements, fire, radio, traffic, and contact with virtual entities and trigger lines under an intricate web of overlays designed to capture and store these specific pieces of data during a training scenario. The system provides automated output displays for an effective after-a ction review following the virtual exercise.

TR 1131
Radio Communications and Situation Awareness of Infantry Squads During Urban Operations. Christ, R.E., and Evans, K.L. July 2002. (AD A405850)

This research evaluated the frequency and content of squad radio communications, and reevaluated situation awareness (SA) data collected by others. Both sets of data were collected using 14 Ranger squads executing urban operations driven by scripted vignettes. The radio communications data highlighted factors that influence and determine the consequences of squad radio communications. These data were differentially sensitive to communications about friendly and threat conditions as well as mission and visibility conditions. Important moderating factors for these results were differences found for downward- and upward-directed communications and conflicting requirements for processing information under conditions of information overload. The reanalysis of the SA data yielded separate measures of SA for squad leaders and their subordinates, and for top-down and bottom-up sources of knowledge about battlefield conditions. The fine-grain reanalysis of SA data showed effects not previously reported and clarified some that were. The data emphasize the need to consider echelon differences in estimating the criticality of battlefield information, as well as the impact on SA of visibility and information overload conditions. Taken together, the results underscore the fact that reliable explanations of the relationship between squad radio usage and squad SA rely on detailed analyses of both factors.

RR 1778
Computer Backgrounds of Soldiers in Army Units: FY00. Fober, G.W., Bredthauer, J.L., and Dyer, J.L. October 2001. (AD A399393)

The ability of soldiers to exploit systems using computers and to learn software quickly depends in part on their prior experience. Soldiers from four Army installations were given a survey that examined their experiences with computers, self- perceptions of their skill, and an objective test of their ability to identify Windows-based icons. The officers and senior non-commissioned officers (NCOs) had the most computer expertise as measured by both subjective and objective measures. For enlisted and junior NCOs the picture was more diverse; almost half the soldiers had limited skills. Owning a computer, frequency of using a computer, and using a computer at work related highly with computer expertise. When specialists (rank of E4) were examined separately, opportunity to use computers as part of their job was related to computer expertise. The results indicate a diverse population, including soldiers with limited computer skills as well as those with programming skills. Those individuals with limited skills would benefit from basic computer training prior to learning to operating one of the Army's digital systems.

RR 1779
Prototype Automated Measures of Command and Staff Performance. Holden, W.T. Jr. and Throne, M.H., and Sterling , B.S. November 2001. (AD A397634)

The transition to the Objective Force is characterized by challenges, such as how the Army will train, maintain, and operate as an information-age force. A key aspect of the Objective Force is command, control,

communication, computers, and intelligence (C^4I) systems. One of the Army's immediate needs is an approach for ensuring that the capacity of digital information systems is fully exploited in combat units, especially among staffs. Staff members must acquire and maintain the skills required on the digital battlefield. Closely linked to training is the need for assessment for feedback and performance improvement, and support for design and development of training programs. Digital C^4I systems offer an exceptional opportunity for efficient and objective methods for staff performance measurement with their potent organic capabilities to collect, analyze, and portray information automatically. This paper describes an effort to develop prototype performance measure output and format that exemplify the potential of digital systems to provide that feedback. Topics covered include a rationale and definition of automated measures and how they relate to measuring skills that staffs and teams need to possess to be successful. The methodology used to design and develop automated measures of staff performance is discussed. Finally, representative results obtained from these automated prototype measures during U.S. Army concept experimentation will be presented, along with lessons learned during this research effort.

RR 1780
Assessing the Effectiveness of a Low-Cost Simulator for Instrument Training for the TH-67 Helicopter. Stewart, J.E. II, Barker, W.C., Weile, D.S., Bonham, J.W., and Johnson, D.M. December 2001 (AD A397649)

The U.S. Army uses the 2B24 Synthetic Flight Training System (SFTS) for the Instrument Phase of Initial Entry Rotary Wing (IERW) training. The SFTS is an instrument

simulator, mounted on a hydraulic motion platform, with no visual system. Its technology dates from the late 1960s. Its cockpit represents the UH-1, which has been replaced by the TH-67 training helicopter. The Army is concerned with the age, complexity and costs of the SFTS, at a time when PC-based simulators, like the Frasca 342 Primary Skills Trainer (PST) are available. The PST's cockpit represents the TH-67 helicopter. It has a visual display, but no motion system. Thirty-eight IERW students were assigned to experimental (PST) or control (SFTS) groups. After 30 hr of simulator training, both groups completed 20 hr training in the TH-67. No students were eliminated or set back to later classes. Few significant differences in performance were noted, though SFTS trainees were more likely to indicate that training in the simulator had hindered performance in the aircraft. The PST seemed inferior to the SFTS in trim control. The research demonstrated that IERW students could learn instrument skills in a simpler, more economical simulator without hydraulic controls or a motion system.

RR 1781
The Commander's integrated training tool for the close combat tactical trainer – 3: Final prototype development. Flynn, M.R., Dannemiller, B., Bonnett, M., Grossman, J.R.,Forrest, D., Bonnett, M., Shadrick, S.B., and Mauzy, R.P. November 2001. (AD A397748)

This report describes the third in a series of projects to design and develop the Commander's Integrated Training Tool (CITT) for the Close Combat Tactical Trainer (CCTT), a system of armored vehicle manned-module simulators and workstations that allows units to train collective armor and infantry tasks at the platoon through battalion task force level.

The CITT provides unit commanders and other trainers with comprehensive information on CCTT and on structured training as well as the ability to produce exercise Training Support packages. Previous projects produced design for the objective CITT and prototype applications in desktop and web-based formats. The current project produced a fully-fieldable CITT including the embedded CCTT Exercise Initialization Tool. This version was expanded to include stability and support operations capabilities, use of CCTT enhancements, and increased flexibility of file use to allow it to run on any computer with sufficient resources. Near-, mid-, and long-term implementation strategies and fielding plans were developed and are presented along with lessons learned and recommendations for future actions.

RR 1782
Training for Adaptability and Transfer on Digital Systems. Schaab, B.B., and Dressel, J.D. November 2001. (AD A399409)

Today's soldiers are being trained to use digital systems to enhance duty performance. This research compared training digital skills to entry-level, enlisted soldiers by the conventional method to training by a constructivist method. The constructivist method actively engages soldiers by using realistic vignettes as training tools to acquire and integrate knowledge of the digital system and the military job. After seven days of training, soldiers trained by both methods were asked to complete 1) a practical exercise requiring application of their training in an unfamiliar vignette and 2) the current schoolhouse exam. No difference was found between the conventional training methods and the constructivist method on the current schoolhouse exam. Soldiers trained using the constructivist method were more

successful in applying their training to solve unfamiliar problems and reported lower levels of workload. The constructivist training method was shown to improve soldiers' adaptation and application of their training to unfamiliar situations.

RR 1783
Working Memory and exploration in Training the Knowledge and Skills Required by Digital Systems. December 2001. Dyer, J.L., and Salter, M.S. (AD A399507)

Variations in computer-based training (CBT) procedures were compared in training the skills and knowledge required of a prototype map interface for the Land Warrior system. Soldiers from four Infantry courses participated, representing the chain of command within an Infantry platoon, from platoon leader to rifleman. Soldiers were first trained on codes that uniquely identified individuals and units on the map. Then soldiers learned how to use map functions such as pan, zoom, determine range, and find individuals and units. Lessons that contained a large volume of information before soldiers could apply that information and commit it to memory resulted in low scores on both the code and map exercises. Breaking up the content into smaller chunks of information tended to be more effective. Although soldiers who learned the map on their own via an exploratory condition had the lowest map performance, exploratory learning may have potential as these soldiers spent relatively little time "exploring." The results demonstrate the importance of adapting to individual differences in the learning rate of soldiers. They also provide insights regarding how to design effective and efficient CBT for digital systems.

RR 1784
The Computer Background of Soldiers in Infantry Courses: FY01. Singh, H., and Dyer, J.L. December 2001. (AD A399394)

The research examined soldiers' experiences with computers, self-perceptions of their computer skill, and their ability to identify frequently-used, Windows-based icons. The report documents the results of the third and last year of Infantry School course surveys. The soldiers surveyed represented the personnel structure of an Infantry rifle platoon. Computer ownership was high among all soldiers. Computer experience was gained in different ways, reflecting the circumstances where computers were available to and used by the groups surveyed. Lieutenants and senior noncommissioned officers had the most computer expertise as shown by their icon scores. However, the lieutenants had a higher perception of their computer skill. For junior noncommissioned officers and privates, the picture was more diverse. A substantial portion of these two groups had limited computer skills, as reflected in their icon scores and self-ratings. The results indicate that prior and special training on basic computer skills would be required for many of these younger soldiers before starting specialized training on a computer-based tactical system. Although only Infantrymen were surveyed, the results should apply to other soldiers throughout the Army with similar educational and military experience.

RR 1785
Making the Transition from Analog to Digital Warfighting: Changes in Unit Behavior and Knowledge. Dudley, M.G., Johnston , J.C., Jones, W.S., Strauss, C.P., and Meliza, L.L. December 2001.
(AD A397575)

This report documents an initial effort to investigate the transition from analog to digital operations at brigade level and below. We interviewed experienced digital warfighters—leaders and soldiers— to identify changes in unit behavior, knowledge, and attitudes resulting from experience with digital systems. Army documents relating directly to digital operations were also reviewed. The research team's subject matter experts analyzed the cumulative data to document insights and lessons learned. The findings revealed a systematic evolution of behaviors, knowledge, and attitudes accompanying the units' transition to digital systems and operations. Initial resistance and reluctance give way to confidence and trust in digital systems as leaders and soldiers acquire basic digital proficiency and then learn how to use the new technology to improve the warfighting process. Digital capabilities alter the way warfighters think and fight, and the operational changes find their way into procedural documents. As digitization progresses, leaders make bolder decisions due to excellent battlefield visualization and improved situational understanding. Planning, preparation, and execution of combat missions benefit from digital advantages. In parallel, the training environment evolves to support digital operations and readiness. The findings contribute to a knowledge base that will help facilitate the transition process in future digitized units. The findings point towards measures that can be used to assess Army and unit progress in making the transition to digital warfigthing.

RR 1786
Situation Awareness in a Virtual Environment: Description of a Subjective Assessment Scale. Matthews, M.D., Beal, S.A., and Pleban, R.J. February 2002.
(AD A399408)

The Mission Awareness Rating Scale (MARS), a subjective situation awareness (SA) rating scale designed to assess SA content and SA workload, was tested in a series of virtual environment exercises. Sixteen enlisted soldiers, working in teams of four soldiers each, completed four urban combat missions in a virtual night environment designed to simulate the experience of working with night vision goggles - NVG (PVS-7Bs) and aiming lights. In each scenario, a different approach for simulating this NVG environment was used. After each scenario was completed, each soldier completed the MARS instrument. This yielded estimates of the SA level and workload involved in four dimensions of SA – perception, understanding, projection, and knowing what decision to make. The results indicated that MARS significantly and robustly discriminated among the different approaches, and these SA estimates were congruent with general estimates of SA content and workload while operating at night in the real world, and with the soldier's subjective rankings of the four simulated NVG environments. While promising, MARS must be validated against objective SA measures, both in the virtual environment and in the field environment. However, MARS seems to hold promise as a relatively unobtrusive and effective SA measure.

RR 1787
Utility of a Personal Computer Aviation Training Device for Flight Training.
Johnson, D.M., and Stewart, J.E. II.
February 2002. (AD A400580)

Personal Computer Aviation Training Devices (PCATDs) have recently been shown to support beginning flight training both in the private sector and the military. These positive results are for fixed-wing aircraft only. The purpose of this research was to investigate which tasks from Initial Entry Rotary Wing (IERW) training could be supported by a PCATD. A utility evaluation was performed. Sixteen aviators, representing both highly experienced and student helicopter pilots, evaluated the ability of a commercial PCATD to support IERW. Seventy-one tasks were selected from Primary and Instrument Flight Training. Aviators performed each task one or more times in the PCATD before rating it on a four-point scale. Additional data were also collected. Results showed remarkable agreement between the experienced aviators and the students. The device was judged as best able to support Instrument Flight Training, especially tasks involving radio navigation. Tasks from Primary Flight Training, especially tasks requiring hovering, were judged as less well supported. The most frequently stated positive comment was that the device would be of value in supporting the training of instrument procedures. The three most frequently cited criticisms of the device concerned narrow field of view, poor visual cues to depth, and inability to hover.

RR 1788

Collective Staff Training In A Virtual Learning Environment. Sanders, W.R.
March 2002. (AD A400495)

As the Army transitions to modern digital command and control technology it faces a major challenge in designing web-delivered training to support the acquisition, retention, and transfer of collective staff skills required to apply these advanced technology capabilities to real-world tasks. This report identifies training program design features based on principles of cognitive psychology that can be incorporated into Virtual Learning Environment (VLE) collective training. A prototype Cognitive Training Techniques Checklist was developed and applied in a review of U.S. Army Armor School Virtual Tactical Operational Center (VTOC) collective training. From this review candidate training program design features were identified that can support VLE training requirements. The examination of VTOC training also provided insights for Train-the-Trainer products, and a description of potential future C2 system operational capabilities and challenges. The research represents a logical extension and continuation of previous U. S. Army Research Institute for the Behavioral and Social Sciences cognitive skills training, and distance learning research conducted to assist the U.S. Army Armor School in assessing the individual self-paced phase of training for a new Armor Captains Career Course – Distance Learning (AC3 DL) offered primarily as web-based instruction.

RR 1789
Simulating Night Vision Goggle Effects in a Virtual Environment: A Preliminary Evaluation. Pleban, R.J., and Beal, S.A.
April 2002. (AD A402194)

This research examined the capabilities of virtual environments to simulate night vision goggle (NVG) effects. Different solutions for simulating NVG images were assessed. Two conditions simulated NVGs but used

different software approaches. Two additional conditions simulated unaided night environments that required soldiers to wear NVGs. Four-man infantry teams conducted urban operation missions under each condition. Objective assessments were obtained on the number of events correctly detected and the average time required to detect an event. Subjective assessments of task difficulty and image fidelity were also made. No significant differences were found across night conditions for either event detection or time. Significant differences in task difficulty ratings occurred for movement, visual detection, and maintaining situation awareness. In general, tasks were more difficult to perform while wearing the NVGs compared to simulated versions of NVG images. Soldiers also ranked the conditions involving actual NVGs as more realistic. The unique contribution of virtual environments for night operations training may be at the entry level. However, specific image fidelity issues associated with the use of NVGs in simulated unaided night environments must be addressed if this approach is to be used as an effective training medium.

RR 1790
An Overview of Automaticity and Implications for Training the Thinking Process. Holt, B.J., and Rainey, S.J. April 2002. (AD A402420)

This report examines the relationship between automaticity and thinking processes. Issues pertaining to the development of automaticity within the thinking process are discussed. A literature review was conducted to examine how automaticity has be en developed in various tasks of all types (e.g., visual search to battlefield thinking). The results of this

examination suggest that automaticity can be developed using consistent rules and extensive practice that vary depending on the type of task. The results also suggest that the more complex the task is the more difficult it will be to train to automatic performance. Principles are presented that are used to guide the development of automaticity. Using these principles, along with previous methodologies for developing automaticity, this report discusses training methods for developing automaticity in the thinking process.

RR 1791
Measuring Digital Proficiency: Assessment Approaches and Echelon Considerations. **Dudley, M.G., Hill, R., Johnston, J.C., Jones, W.S., LeGare, M., Leibrecht, B.C., Longoria, K., and Meliza, L.L. June 2002.** (AD A405055)

Digitization threatens to overwhelm trainers with observation requirements, making it crucial to identify aspects of unit performance likely to warrant the attention of trainers and others with a need to measure unit digital proficiency. This report encompasses two approaches used to target high-payoff measurement objectives. First, the research team described differences between brigade and battalion echelons in terms of how digital systems are employed. This approach assumed that a high priority for brigade exercises is to address brigade-unique aspects of digital proficiency. Second, the team described how units can use digital systems to gain two of the major advertised benefits of digitization, reducing fratricides and gaining greater control over how and when contact is made with the enemy. In addition to describing unit actions that can be supported by effective use of digital systems (e.g., supporting unit transition from movement to maneuver), the team considered whether it is better to

measure digital support of each action using an all-or-none approach or a graded approach. This latter consideration provides input for efforts to define digital proficiency levels.

RR 1792
Human-System Integration for Future Command and Control: Identifying Research Issues and Approaches.
Lickteig, C.W., Sanders, W.R., Shadrick, S.B., Lussier, J.W., Holt, B.J., and Rainey, S.J. July 2002. (AD A405044)

The Army's transformation to Future Combat Systems (FCS) poses an unprecedented alliance of humans and machines, particularly for Command and Control (C^2). Creating a human-machine alliance that actually improves command and control is a severe challenge in human-system integration for FCS. First, this report selectively identifies four overarching research issues for command and control: Allocation, Autonomy, Authority, and Awareness. Second, two complementary research approaches, mid-scale and small-scale transformation environments, for investigating human-system integration issues are described. An example of a mid-scale transformation environment from the FCS C^2 program is provided with selected results from Experiment 1 on human-system integration. The value added by small-scale transformation environments, however, is needed to maintain a human-centric focus and provide two unique roles: a breeding ground for innovation *to* larger environments, and proving ground for issues *from* larger environments. An example of an emerging small-scale transformation environment directed at FCS concept exploration and training is provided. The core technical, operational and human performance assets currently available for this small-scale transformation environment

are described. The report's intended audience includes any members of the user, researcher, and developer community who might benefit from, or provide benefit to, the Army's ongoing FCS research program.

RR 1793
Command Group Training in the Objective Force. Gossman, J.R., Burnside, B.L., Flynn, M.R., Dannemiller, B., and Mauzy, R.P. July 2002. (AD A406176)

As part of future force development, the U.S. Army has begun a transformation to an Objective Force capable of achieving full-spectrum dominance in all future conflicts. This transformation will require changes in training, particularly the training of teams. Objective Force teams will likely consist of small groups of individuals (and probably robots or intelligent agents) and will have new and modified performance requirements leading to unique training needs. Teams will conduct training continuously using portable devices and training support capabilities embedded in their vehicles. Meeting these sorts of team training requirements is likely to require new training tools and techniques. This project collected and analyzed information related to Objective Force Unit of Action command groups, and, based on the analyses, developed training requirements for and identified an approach to training teams that fully supports training anytime, anywhere using operational equipment. A discussion of future research and development issues is also provided. The results of this project can benefit those involved in further definition and development of the training requirements, particularly team training requirements, for the transformation to the Objective Force.

13

RR 1795
**Assessing Situation Awareness in Field
Training Exercises.** Matthews, M.D., and
Beal, S.A. September 2002.
(AD A408560)

The Mission Awareness Rating Scale
(MARS) and the Situation Awareness
Behavioral Rating Scale (SABARS) are
metrics designed to assess situation
awareness (SA) among infantry soldiers and
their leaders. MARS is a subjective self-
assessment device and SABARS involves
expert observer-controllers evaluating a
target soldier on SA-related behaviors. The
purpose of the current study was to field test
both metrics in a field training exercise.
Eight cadet platoon leaders and eight cadet
squad leaders participating in summer cadet
field training at the U.S. Military Academy
completed the MARS instrument and
received SABARS evaluations from
observer-controllers following the completion
of an assault mission. Results indicated that
platoon leaders rated their SA higher than did
squad leaders on the MARS instrument and
that higher-order SA was rated as more
difficult than lower- order SA . SABARS
ratings did not differ as a function of leader
position, but the global SABARS SA item
was a strong predictor of ratings of individual
performance. Finally, SABARS was rated by
the observer-controllers as easy to use and
relevant to assessing SA in the field. Both
MARS and SABARS show promise of
applicability to assessing SA in field settings.

RP 2002-01 Cancelled

RP 2002-02
Think Like A Commander: Captain's
Edition – Prototype 1.0. Shadrick, S.B.,
and Lussier, J.W.   July 2002.
(AD B282977)

Think Like A Commander: Captain's
Edition – Prototype 1.0 was implemented in
the Armor Captain's Career Course at Fort
Knox, KY in January 2002. This CD-ROM
contains the installation program needed to
use the Think Like A Commander (TLAC)
software application. Think Like A
Commander was developed to support the
Adaptive Thinking Training Methodology
and is grounded in sound learning practices
designed to support the use of deliberate
practice principles. The aim of TLAC is to
maximize the development of commanding
officers thinking skills, teaching officers
"how to think" instead of "what to think."
This will enable the officer to make sound
decisions when the situation deviates from
the expected and the ability to think
adaptively is required, particularly when
limited time is available to make a decision
and when under extreme pressure and/or
stress.

S48
Women in the Army: An annotated Bibliography. Simutis, Z.M., Harris, B.C., and Gantz, M.M. May 2002. (AD A402416)

This report provides an overview of research, studies, and analyses performed by the U.S. Army Research Institute on the utilization and training of women in the Army. As numbers and roles of women have expanded since the All Volunteer Force began in the early '70s, a number of research projects have been completed to address both the utilization and integration of women in Army units and the training of women, particularly in the Initial Entry Training program for combat support and combat service support soldiers. The report also provides an annotated bibliography of research and studies conducted during the 1990s on a wide variety of issues related to women in he Army.

S49
Distance Learning: The Soldier's Perspective. Wisher, R.A., Sabol, M.A., Moses, F.L., and Ramsberger, P.F. May 2002. (AD A407336)

The primary purpose of this report is to examine distance learning (DL) from the perspective of the soldier. A summary of the history of DL describes its applications in the Army and plans for additional uses. Findings from research and comments from surveys are examined to reveal how well soldiers accept DL as an effective teaching method within different types of training courses (e.g., small unit training versus individual professional development). The strengths and weaknesses of DL are discussed, leading to a list of recommendations to help trainers produce effective DL courses.

S50 Cancelled

S51
What We Know About AWOL and Desertion: A Review of the Professional Literature for Policy makers and Commanders. Ramsberger, P.F. and Bell, D.B. August 2002. (AD A407801)

Enlisted desertion rates in the U.S. Army have been increasing in recent years. A study has been undertaken to examine this issue to shed light on why soldiers desert and what can be done to intervene and lessen its occurrence. As a first step, the literature on desertion was reviewed and summarized. The topics covered in this report include how desertion is defined and handled currently, how deserters differ from other soldiers, the reasons for desertion found in previous research, the consequences of desertion, steps that can be taken to prevent this outcome, and what needs to be learned to assist Army decision makers and commanders as they seek to deal with this problem.

S52
Selection for Leadership: Transforming NCO Promotion. Campbell, R.C. and Knapp, D.J. August 2002. (AD A407790)

The NCO21 research program was undertaken to help the U.S. Army plan for the impact of future demands on the noncommissioned officer (NCO) corps. The performance requirements and associated knowledge, skills, and aptitudes (KSAs) expected of future successful NCOs were used as a basis for developing tools that could be incorporated into an NCO performance management system geared to 21st- century job demands. This report provides a user-oriented overview of the "NCO21" project and the tools that it has produced.

SR 2002-01
Development of a personal computer-based enlisted personnel allocation system (PC-EPAS). Greenston, P.M., Mower, D., Walker, S.W., Lightfoot, M.A., Diaz, T.E., McWhite, P.B., and Rudnik, R.A. October 2001. (AD A399441)

This report summarizes the development of the PC-Based Enlisted Personnel Allocation System (EPAS) through completion of the Functional Description phase (circa 1998). EPAS is a software system designed to introduce person-job-match optimization into REQUEST, the Army's training reservation system. This report reflects the results of research conducted and sponsored by the U.S. Army Research Institute over the 1993 – 1998 period. This work established the feasibility of using sophisticated optimization procedures to improve classification efficiency, as well as the additional classification gains made possible by utilizing measures of soldier performance as assignment composites in the classification process. The production version of EPAS, designed as an enhancement to and subsystem of REQUEST, will be transparent to Army applicant and career counselor. Evaluation field-testing is scheduled for FY 2002 – 2003.

SR 2002-02
Workshop on language student attrition. Whelan, B.E. December 2001. (AD A399533)

Seventy individuals from Government agencies (military and civilian), academia, and contractor organizations attended all or parts of a *Workshop on Student Attrition* held at the Defense Language Institute Foreign Language Center (DLIFLC) in Monterey, CA 22-24 August 2001. The goals of the workshop were to:

- Assess the level of DLIFLC linguist attrition.
- Analyze the causes and patterns of attrition.
- Recommend ways to improve the rate of attrition.

This report is the proceedings of the workshop. It provides documentation of papers and briefings presented to workshop participants, along with recommendations for reducing attrition that were generated by the participants.

SR2002-03
Proposed new Army aptitude area composites: A summary of research results. Greenston, P.M. (January 2002). (AD A398686)

The Army currently employs nine Aptitude Area (AA) composites to classify new recruits; they are derived from the Armed Services Vocational Aptitude Battery (ASVAB) subtests in a manner that makes them easy to calculate but inefficient for classification. At the end of 2001 the Office of the Secretary of Defense (OSD) will eliminate the two timed subtests in the ASVAB . This will reduce the classification efficiency of the existing Army composites and necessitate redefinition of the existing composites. In their place the Army is considering for adoption new composites that have been developed by ARI based on a job performance criterion. ARI has developed a set of 17 operational classification-efficient job families and corresponding composites that would be used for administrative, counseling, and school proponent purposes. The new structure strongly resembles the existing structure, in effect being a further shredding of existing families. The new composites / job families are undergoing further testing and evaluation, and will be considered for implementation in the 2004 - 2005 period. In the meantime ARI has

developed an interim set of composites that retain the existing nine operational job families but are also based on defensible job performance data. These will be implemented January 2002 while planning for the new 17 Army Aptitude Area composites goes forward.

SR 2002-04
Managing Force XXI Change: Insights and Lessons Learned in the Army's First Digital Division. Leibrecht, B.C., Johnston, J.C., Black. B.A., and Quinkert, K.A. March 2002. (AD A400644)

This report is the result of a study that explored techniques for capturing and sharing tacit knowledge gained during Force XXI transition. The primary goal was to facilitate passing of hard-won information from one leader to the next. The study team elicited knowledge in structured interviews with senior leaders in the Army's First Digital Division (FDD). They converted the knowledge into problem-focused chunks, then derived practical guidelines for facilitating change. The team designed and developed a preliminary, computer-based Leader's Tool to help the target audience define and solve change-management problems. They then populated the tool with the project's knowledge products. The report discusses the team's lessons learned for capturing and organizing sharable knowledge and for creating automated tools to support the management of change. It also illustrates the FDD leaders' insights and lessons learned regarding the transition process and the impact of Force XXI capabilities. Recommendations for leveraging and extending the project's methodology and the Leader's Tool technology are offered.

SR 2002-05
Individual and Collective Training in Live, Virtual and Constructive Environments – Training Concepts for Virtual Environments. Sticha, P.J., Campbell, R.C., and Knerr., C.M.. April 2002. (AD A402313)

The goals of this research are (a) to develop a method for evaluating the capabilities of virtual simulation to represent the tasks and missions within a military application domain, (b) to demonstrate the methods in two domains, and (c) to propose ways to integrate the method with existing doctrine. Initial activities surveyed existing training systems and reviewed the capabilities of key virtual environment technologies. From this survey, we identified capabilities most likely to impede successful development of virtual environment training systems. A review of existing methods of evaluating or predicting training effectiveness identified several candidates for incorporation into the method produced in this project. Based on the results of this review, we developed a method for Specifying Training Requirements in Virtual Environments (STRIVE), combining features from two existing methods. The STRIVE methodology assesses the capability of virtual environment technology to support task performance based on subject matter expert judgments of selected cues and responses needed to perform task activities. A demonstration of the model was developed using Microsoft Access97. The STRIVE methodology can be used during the concept exploration and definition phase of virtual environment training system design and can support the development of the Operational Requirements Document (ORD).

SR 2002-06
The Multi-Skilled Soldier Concept: Considerations for Army Implementation
Nelsen, J.T. II and Akman, A. April 2002. (AD A402901)

The purpose of this study was to analyze the meaning and implications of the Multi-Skilled Soldier (MSS) Concept and to assess the considerations for Army-wide implementation in order to provide a basis to make decisions whether or not to proceed with realization of the MSS Concept and, if so, how. The specific objectives were to analyze the Concept and its implications generally for the Army and specifically for the Objective Force, to develop a Blueprint for use in defining and assessing potential MSS implementation and sustainment courses of action, to devise a Roadmap outlining major actions required for MSS implementation by 2008, to craft a Study Plan of research and analysis projects, including behavioral research, necessary to support MSS implementation and sustainment, and to make pertinent conclusions and recommendations. This study relied heavily on non-attribution interviews conducted from August 2001 through January 2002 with those involved in developing the concepts for the Objective Force and in fielding the initial Interim Brigade Combat Teams (IBCTs). This report serves as a departure point for further research and development work relating to crafting and assessing implementation and sustainment courses of action, as well as supporting personnel and training designs and associated best practices.

SR 2002-07
Training on the Web: Identifying and authenticating learners. Curnow. C.K., Freeman, M.W., Wisher, R.A., and Belanich, J. June 2002. (AD A405005)

Soldiers who receive training in the workplace, at their residences, or at other sites outside the traditional classroom increasingly rely upon asynchronous distributed learning systems. This accentuates the need to identify various forms of training compromise, such as obtaining questions beforehand or enlisting a proxy for test taking in non-proctored, web-based learning environments. A one-day workshop, summarized in this report, was conducted to identify practical solutions to training compromise on the Web or military intranets. Experts from government, academia, and industry generated solutions in the areas of test security, biometrics (including fingerprint identification, face recognition, iris scanning, and hand writing recognition), legal issues, public key infrastructure, instructional design, and test design. Following the workshop, an Army advisory group prioritized the solutions into a final list of recommendations, included here as a starting point for addressing and preventing training compromise.

SR 2002-08
Training Model for Contingency Operations. Smith, M.L., Holden, W.T. Jr., Starry, H.M. July 2002. (AD A408556)

This report documents the process and the products of a study examining training and training support for units involved in deployments for contingency operations. The purpose of this study was to assist U.S. Army leaders and training resource managers to better train units, staffs, leaders and soldiers based on the realities and challenges of the 21st century operational environment. It was completed in support of a specific request made by the U.S. Army Training and Doctrine Command (TRADOC) for assistance in providing training support to Army ground forces

preparing for, participating in, or returning from contingency operations. The study began by surveying the existing body of knowledge concerning U.S. military contingency operations and military deployments conducted in the 1990s. The survey's purpose was to identify and codify full spectrum training and training resource requirements for units participating in contingency operations. The survey's findings were then used to develop an improved training model and associated templates, and to recommend changes in current training policies and procedures. The eight principal recommendations address training strategies, training documentation, resourcing, decision-making, and training management.

SN 2002-01
Update of U.S. Army Research Institute's Officer Personnel. Young, W.Y. June 2002. (AD A403182)

This document describes the procedures performed to add 1999 and 2000 personnel data to the Longitudinal and Core data sets of the Officer Longitudinal Research Data Base (OLRDB) and the Core Data Set of the Officer Standardized Educational Testing Data Base (OSETDB). These data sets, which were designed for research purposes, contain historical and current data on U. S. Army Officer personnel. The OLRDB contains career history data primarily from the 1979 through 2000 Officer Master Files (OMF) and the Separation Officer Master Files (SOMF). A secondary data source was included to record early separations due to incentive programs. These data were captured from the Voluntary Separation Incentive/Special Separation Benefit (VSI/SSB) file. The OSETDB contains academic measures for officer personnel commissioned between 1980 and 1990 in the form of standardized scores. The testing data consists of the Scholastic Aptitude Test (SAT) from the Educational Testing Service and the American College Test (ACT) from the American College Testing Program for the academic years 1973 through 1985.

SN 2002-02
Investigations Related to the Implementation of the Assessment of Individual Motivation (AIM). Knapp, D.J., Waters, B.K., and Heggestad, E.D. (Eds). July 2002. (AD B282977)

The Assessment of Individual Motivation (AIM) test was developed by the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) to assess work-related temperament characteristics. In February 2000, the Army implemented AIM as a new market-expansion enlistment screening tool under the "GED Plus" program. Under this program, non-high school diploma graduates who might otherwise be ineligible for military service can enlist if they score sufficiently high on the AIM and meet other program requirements. This project is addressing several operational issues pertaining to AIM's ongoing use in the GED Plus program. Post-implementation investigations have included (a) a preliminary examination of the operational AIM's validity against attrition under the GED Plus program, (b) the scaling of AIM alternate forms, (c) an examination of variables that might be used to supplement AIM in the prediction of first-term attrition, (d) fairness analyses, and (e) efforts to develop improved ways to score the AIM.

RN 2002-01
Learning to Suppress Competing
Information: Do the Skills Transfer?
Gernbacher, M.A. July 2001. (AD
A395942)

This report discusses the laboratory research
on the cognitive mechanism of suppression.
The goal of this study is to identify the
cognitive processes and mechanisms that
underlie language comprehension and
comprehension in general.

RN 2002-02
Recruitment to the All-Volunteer Force.
Harries-Jenkins, G. December 2001.
(AD A397593)

Western military establishments which have
decided to shift from conscription (the draft)
to volunteerism as the basis of recruitment
to their armed forces, commonly face very
considerable challenges. The economic
dimensions of the latter are critical, but the
social, political and cultural issues
associated with the change of recruitment
policy cannot be overlooked. From the
analysis of these dimensions and issues, we
can begin to establish a model of good
practice which is both a refinement of
traditional approaches and an acceptance of
more radical alternatives. Such a model
reflects a five-step strategy; the alteration of
goals and objectives; substitution between
personnel; privatization and civilianization;
internationalization, and changes to
conditions of recruitment and service
(ASPIC).

RN 2002-03
The Characterization and Prediction of
Soldier Performance During Routine
Service and in Combat. Dover, S.H.
January 2002. (AD A399051)

This study aimed to explore (1) the
relationship between soldier performance
during routine service and performance in
combat; (2) the differential efficiency of
selection scores in predicting routine vs.
combat performance; and (3) the construct
structure portraying combat soldier
performance. Four groups of Israeli
Defense Force soldiers were subjects in the
study; they were evaluated by ratings
obtained by their direct commander, as well
as hard data measures. Ratings of peacetime
and combat performance showed significant
moderate correlations. The ratings represent
a meaningful construct structure and are
efficient in predicting combat performance.
Factor analysis yielded two factors each
representing combat soldier performance in
battle and performance during routine
service, and three factors representing non-
combat soldier performance. The predictive
and constructive validity they show make
the questionnaires employed in this study
both efficient predictors and useful
evaluation procedures of soldier
performance in combat. These results have
direct implications to unit command and unit
management during routine service and to
attitudes which commanders would strive to
impart in their soldiers.

RN 2002-04
Exploring the Nature and Acquisition of
Tacit Knowledge for Military Leadership.
Antonakis, J., Hedlund, J., Pretz, J.E., and
Sternberg, R.J. January 2002.
(AD A400486)

In this report we first introduce traditional
notions of leadership and their limitations,
and the importance of tacit knowledge for
military leadership. We then present
Sternberg's (1985, 1988, 1997) triarchic
theory of intelligence and the role of
practical intelligence and tacit knowledge in
successful leadership. Next, we examine in-

depth the nature of tacit knowledge, how it is defined and measured, how it differentiates experts from novices, and how it is bounded. Furthermore, we present a model of practical intelligence and tacit knowledge acquisition, and demonstrate how tacit knowledge may be acquired experientially and vicariously. Based on the literature reviewed, we draw hypotheses that we test empirically. We then present the results of our findings and discuss their theoretical and practical implications. Last, we relate our findings to the purpose of this report, and to the research questions we sought to answer.

RN 2002-05
Contract for Manpower and Personnel Research and Studies II (COMPRS-II) Annual Report – Year Three. Human Resources Research Organization. January 2002. (AD A398756)

This report documents and summarizes the activities of the first 3 years of a 5-year (1 base year and 4 option years) project to provide the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) non-personal, short- and medium-term scientific and technical support services in the solution of problems related to manpower and personnel. The program is referred to as the Contract for Manpower and Personnel Research and Studies II (COMPRS-II). The Human Resources Research Organization's primary responsibilities are to administer COMPRS-II for ARI under firm fixed-priced contracts by managing three inter-related tasks: (a) managing the COMPRS program in accordance with established operating procedures; (b) receiving and processing individual Statements of Tasks from ARI; and (c) managing, reporting progress on, and documenting the completion of delivery orders.

RN 2002-06
Intelligent Dialog Tutor and Conversational Agents. Sams, M., Murray, W.R., DeSmedt, W.H., Loritz, D. January 2002. (AD A399439)

The report describes research done to develop a prototype of an easy to use authoring system for an intelligent, computer-based trainer. It focuses on simulated agents who are capable of mixed-initiative dialog with the user through a natural language interface. Trainees converse as they would in normal English discourse asking questions, giving answers, and making comments. The simulated agent generates appropriate responses within any defined domain. The resulting tutor provides individualized instruction based on trained performance. The system is fully authorable and conversational agents are easily created for new scenarios. Technologies used include: natural language processing, semantic analysis, discourse management, agent control architectures, and distributed object-oriented software.

RN 2002-07
Development and Application of An Automated Data Analyzer. Connelly, E.M. March 2002. (AD A400503)

In order to seek and test determinants of unit effectiveness, the ADA was developed based on the idea that search and analysis of large amounts of data can be automated if variables can be converted into a standard form. In addition, the methodology permits an analyst to identify, in a first iteration, large sets of variables and associated parameters he/she thinks may be relevant to an issue, and assist in their refinement, combination, and elimination in later iterations. The ADA does this by providing a concise visual presentation of the relationships among a large number of

variables. This facilitates identification of variables and combinations of variables, in complex data sets, that are related to mission outcomes and to each other.

Project results show that ADA analysis can be used to extract effectiveness information from the ARI National Training Center (NTC) data base for analyst review and automated data analysis. The method allows considerable flexibility allowing the analyst to adjust, modify, and create new analyses with some case and flexibility. Use of analysis specification files allows automatic documentation and the repeated use of analyses. Complex analyses can be gradually built to assess company/team and task force (TF) performance.

RN 2002-08
Teamwork Assessment Scales for C^2 Functions for Battalions and Brigades.
Kyne, M.M., Militello, L.G., Thordsen, M.L., and Klein, G. March 2002.
(AD A400488)

This report offers an extensive review of various team literatures, including research from the areas of command and control and industrial/organizational psychology. A complete set of references is included. Leading models of team performance are identified, and, along with their assessment tools, they are analyzed for similarities in concepts, dimensions, behaviors, and behavioral anchors. Based on this analysis, a comprehensive model of advanced team performance (ATP) has been generated and an assessment tool is being developed. Plans for field testing are outlined.

RN 2002-09
A Model-Based Team Decision-Making and Performance Assessment Instrument: Development and Evaluation. Volumes I and II. Kyne, M.M., Thordsen, M.L., and Kaempf, G. (AD A400491)

A two-year Phase II SBIR effort for the U.S. Army Research Institute (ARI) had as its goals the identification of factors that contribute to advanced team decision making and performance, and the development of a theory-based model of advanced teams. The assessment instrument is one of the products of this research. Volume II is the handoff and instructional package. A summary report of the project has been published as ARI Research Note 2002-10.

RN 2002-10
A Model of Advanced Team Decision Making and Performance: Summary Report. Thordsen, M.L., Kyne, M.M., and Klein, G. March 2002. (AD A400497)

A two-year Phase II SBIR effort for the U.S. Army Research Institute (ARI) is described. The goal of the effort was to identify factors that contribute to advanced team decision making and performance to develop a theory-based model of advanced teams. This work produced four products: a review of current team literature, a model of Advanced Team Decision Making (ATDM 2.0), a field test and evaluation of an assessment instrument based on the ATDM 2.0 model, and a package of materials compiled to demonstrate that the model and assessment tool could be "handed off" to and applied by domain personnel. These four products are briefly described. Some issues concerning application of the model are discussed and future directions are outlined.

RN 2002-11
Developing Effective Military Leaders: Facilitating the Acquisition of Experience-Based, Tacit Knowledge.
Cianciolo, A.T., Antonakis, J., and Sternberg, R.J. September 2001.
(AD A400614)

The objective of this project is to explore methods for facilitating the acquisition of tacit (i.e., experience-based) knowledge by military leaders. We are investigating the cognitive information processes through which individuals who gain relatively more from their experiences acquire information from stimuli and events in their environment. As tacit knowledge is a critical component of practical intelligence, we expect to show that facilitating the acquisition of tacit knowledge will, in turn, improve practical problem solving. Improved practical problem solving has obvious implications for improved leadership in the complex, rapidly changing environment in which military leaders must work.

RN 2002-12
Modeling Human Performance: Effects of Personal Traits and Transitory States. Witmer, B.G., and Jerome, C. June 2002. (ADA 405062)

In a recently published report, Gillis, Hursh, Guest, Sweetman, & Ehrlich (2000) reported the development of a Human Performance Model (HPM) for representing realistic behavior by Computer Generated Forces (CGF) Command Entities (CEs). The model as described by Gillis et al. (2000) includes the effects of experience, stress, sleep, and circadian rhythm on the decision-making performance of CEs, but does not completely describe some other variables (e.g., the effects of intelligence, aggressiveness, and personality type) represented in the implemented version of the model. This report supplements the Gillis et al. (2000) report by fully documenting the implemented HPM to include the effects of these additional variables. This documentation includes flow charts that show how each variable is calculated and how the model components relate to each other. Separate model flow

charts are provided for positive, negative, and neutral personality types, along with the equations for computing all model variables. Model deficiencies are identified and improvements are suggested, including better representation of emotions, and inclusion of attention, situational awareness, learning, and leader goals and expectations. Finally, a conceptual model showing how these parameters interrelate is presented.

RN 2002-13 Cancelled

RN 2002-14 Number not used

RN 2002-15
Bradley M2A3/M3A3 Embedded Training System (BETS): Initial User Assessment. Rich, K.L.B., and Salter, M.S. August 2002. (AD A408288)

This report documents a limited user test of the prototype Bradley Embedded Training System (BETS). The BETS is designed to be an on-vehicle system, using vehicle hardware and software, and the same training device software as the already fielded BATS, Bradley Advanced Training System. Nineteen M2A3 Bradley-qualified soldiers performed two gunnery exercises using the BETS and reported their initial impressions about the device and its potential usage. Preliminary results indicated that user satisfaction was high, and potential good. Further research is necessary to determine BETS use in training and operational environments.

RN 2002-16
Department of the Army Research and Development Organization of the Year Excellence Award. U.S. Army Research Institute for the Behavioral and Social Sciences. August 2002. (AD B282039)

As an Army laboratory under the Assistant Secretary of the Army for Acquisition, Logistics, and Technology (ASA-ALT), the U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) submitted their major accomplishments for Fiscal Year 2001 to be considered for a Research and Development Organization of the Year Award. The arched nomination package provides information about ARI, the major technical accomplishments and the business accomplishments for FY01. Major technical accomplishments included developing a training strategy that optimized the use of simulators and live aircraft that has the potential to improve rotary wing aviator training, reduce costs, and improve safety; the major business accomplishment adapted the Activity Based Costing (ABC) model to meet the requirements of an R&D organization, collected data across the organization, and used he data and analysis from ABC to improve internal resource management.

RN 2002-17
U.S. Army Research Institute FY 2001 Government Performance and Results Act Performance. U.S. Army Research Institute for the Behavioral and Social Sciences. June 2002. (AD B282014)

The FY 2001 Performance Report has been prepared by the United States Research Institute for the Behavioral and Social Sciences (ARI) in response to the Government Performance and Results Act (GPRA) of 1993, Public Law 103-62. It is ARI's sixth annual GPRA performance report, providing feedback to ARI employees, managers, and the public as to how well ARI met the goals set forth in its FY 2001 Performance Plan. The performance data are also being used to reassess programs, establish FY 2002 goals, and continuously improve organizational practices related to performance planning and accountability.

RN 2002-18
Carnegie Hall: An Intelligent Tutor for Command-Reasoning Practice Based on Latent Semantic Analysis. Lochbaum, K.E., and Streeter, L.A. September 2002. (AD A406129)

Report developed under a Small Business Innovation Research Program 99.2 contract for topic OSD00-CR02. Scenario-based training techniques, e.g., U.S. Army Research Institute for the Behavioral and Social Sciences' (ARI's) "Think Like a Commander," exercise command cognitive readiness skills. These techniques currently depend on discussion with live mentors. Phase I demonstrated that such scenarios could be taught using a web-based interactive facilitator/mentor. The web-based facilitator asks questions relevant to one scenario, and students write short text responses. Using Latent Semantic Analysis' (LSA) understanding of natural language, the intelligent mentor/facilitator analyzes the essay's content and determines the student's weak areas for further questioning. The LSA-based prototype was constructed rapidly and greatly benefited from automatically training the system on a large amount of military text. It did not require the handcrafted knowledge models and rule-bases of conventional intelligent tutors.

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Abbreviations

RN	**Research Note**		**SN**	**Study Note**
RP	**Research Product**		**SR**	**Study Report**
RR	**Research Report**		**TR**	**Technical Report**
S	**Special Report**			

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Hayes, P.B., Schaab. B., & Moses, F.L. (2001, January-February). A way to train digitally proficient soldiers. *Army AL& T*, 18-19.

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Singer, M. (2001, June). Training and Reduced Side Effects in Virtual Environments. Poster presented at the American Psychological Society annual convention, Toronto, CA.

Young, M.C., White, L.A., & Heggestad, E.D. (2001, August). *Faking resistance of the Army's new non-cognitive assessment measure.* Poster session presented at the 2001 annual convention of the American Psychological Association, San Francisco, CA.

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Mackin, P., Hogan, P., & Greenston, P. (2002, July). *SRB retention model estimation and Analysis.* Paper presented at the Western Economics Association meetings, Seattle, WA.

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Sterling, B. (2002, June). *Use of a Warfighter In-the-Loop Simulation Environment to Improve Command and Control of Future Forces.* Paper presented at the 69th MORSS conference, Annapolis, MD.

Throne, M. (2001, November). *Prototype Automated Performance Measures for Future Battle Staff.* Paper presented at the Interservice/Industry Training, Simulation and Education Conference (I/ITSEC), Orlando, FL.

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